

**ABSTRACT OF THE DISCLOSURE**

[0072] Systems and methods are described for spatial-heterodyne interferometry for reflection and transmission (SHIRT) measurements. A method includes digitally recording a first spatially-heterodyned hologram using a first reference beam and a first object beam; digitally recording a second spatially-heterodyned hologram using a second reference beam and a second object beam; Fourier analyzing the digitally recorded first spatially-heterodyned hologram to define a first analyzed image; Fourier analyzing the digitally recorded second spatially-heterodyned hologram to define a second analyzed image; digitally filtering the first analyzed image to define a first result; and digitally filtering the second analyzed image to define a second result; performing a first inverse Fourier transform on the first result, and performing a second inverse Fourier transform on the second result. The first object beam is transmitted through an object that is at least partially translucent, and the second object beam is reflected from the object.